The Effectiveness of Melodic Intonation Therapy for Chinese Speakers with Non-fluent Aphasia: A Pilot Study

Introduction

Melodic Intonation Therapy (MIT) has been reported as an effective treatment approach to non-fluent aphasia since its first introduction (Albert, Sparks, & Helm, 1973). It utilizes the musical elements of speech (rhythm and melody) to facilitate speech production by capitalizing on some functions presumably subserved by the undamaged right hemisphere (Norton, Zipse, Marchina, & Schlaug, 2009; Sparks, 2008). The supportive evidence comes predominantly from case or case series reports (Albert et al., 1973; Belin et al., 1996; Bonakdarpour, Eftekharzadeh, & Ashayeri, 2003; Goldfarb & Bader, 1979; Laughlin & Naeser, 1979; Schlaug, Norton, Marchina, Zipse, & Wan, 2010; Wison, Parsons, & Reutens, 2006). To date, there is a paucity of randomized controlled trial (RCT) research on MIT. The present authors were thus motivated to launch a RCT program to bridge the gap. This submission reports some preliminary findings on the pilot study leading to our RCT program that is under way. A two-phase treatment program spanning 20 weeks was designed for the pilot study, yet only the data from Phase I lasting for 8 weeks are presented here.

This pilot study is important for it would allow us to determine the weight of each of the two musical elements, *rhythmic tapping* vs. *melody intoning*, involved in MIT as applied to Mandarin Chinese, a language whose syllabic tones contribute significantly to lexical semantics. The tone value of each syllable changes in intoned utterances but not in those with an exaggerated rhythm. The results of the pilot study would then direct us to adjust the weight of the two elements in the subsequent RCT program. Another purpose of this pilot study was to estimate the short-term language outcome of Phase I of the treatment program.

Method

Participants: Six speakers of Mandarin Chinese with mild non-fluent aphasia participated in this program. Two patients were excluded from this report for some of their outcome data were missing. The four remaining participants (three males and one female), aged from 40 to 66 (mean: 53.25), were all stroke patients with post onset time greater than one year (range: one to 11 years). Two had high school diploma and two had bachelor degrees. They had received speech therapy before this program.

Treatment program: The MIT treatment program was run by an experienced clinician with degrees in music therapy. In Phase I, the participants received group therapy in weekly sessions over consecutive eight weeks, each session lasting for two

hours. In each session, the therapy focused on a target utterance, four to 10 morphemes long, pre-selected for each participant. The composition of these target utterances was tailored to the communicative needs of each individual. Each session incorporated the essential elements of MIT such as hand tapping, singing in unison, intoning, and question probing. Despite its group format, a large part of each session was run as small one-on-one sub-sessions. Within each sub-session, the participant went through these steps in turn: (1) review of earlier target utterances, (2) probe question (on the weekly target utterance) #1, (2) rhythmic tapping (RT), (3) probe question #2, (4) melodic intoning (MI), and (5) probe question #3. Figure 1 illustrates how an exemplar sentence was paired with an exaggerated rhythm and an intoned pattern.

Outcome measures: The overall language performance of each participant was evaluated, before and after Phase I treatment, with the Concise Chinese Aphasia Test (or CCAT; Chung, Lee, & Chang, 2002), which is similar in format and scoring methodology to Porch Index of Communicative Ability (or PICA; Porch, 1981). Like PICA, the CCAT was designed to elicit verbal, graphic, and gestural responses from the individual with the aid of eight everyday objects. It consists of nine subtests and each is comprised of ten items. The test adopts a multidimensional scoring system with a maximum score of 12.

Speech fluency was examined in three ways. First, the mean length of utterance (MLU) was computed over the Picture Description subtest of CCAT before and after Phase I. Second, the MLU was also calculated for each production of the target utterance by the participants on the three occasions of probe question over the last four sessions. Finally, the MLU and the maximum length of utterance were both computed over the reviewed utterances.

Results and discussion

Overall language performance as revealed by the CCAT scores did not appear to change significantly over the treatment course (Figure 2). Neither did speech fluency as measured by MLU on Picture Description subtest of CCAT show any improvement (Figure 3). However, despite some individual variability, there appeared to be a general trend of increasing MLU (Figure 4) and maximum length of utterance (Figure 5) for the reviewed target utterances with treatment. Another way of showing the training effect is to compare the performance on the three occasions of probe questions. Figure 6 clearly suggests that both rhythmic tapping and melodic intoning led to substantively larger MLU of the target item than the control probing condition. But there is no way of telling whether rhythmic tapping or melodic intoning was the more effective method of the two.

It is not surprising that the overall language performance remained unchanged over Phase I treatment. After all, the treatment period reported here lasted for only eight weeks. One might expect to observe a more remarkable change with longer and more intense training as suggested by other authors (Bonakdapour et al., 2003; Helm-Estabrooks, Nicholas, & Morgan, 1989; Schlaug et al., 2008). The fact that speech fluency as reflected by MLU on the narrative productions did not change can also be attributed to the low intensity of training. Preliminary analyses of our Phase II data indicated some improvement with this fluency measure at the end of the full 20-week program.

The target utterance data, however, revealed some positive findings. First, the target utterances became longer with treatment. The improvement made by Participants #1 and #2 was more pronounced as one compares their performance at Week 8 or Week 6 against performance at Week 2. Of course, such improvement was rather limited in both the scope and dimensionality of measurement. That is, we did not examine other measures of fluency, nor did the results generalize to other production tasks. Further, one may also protest that measures such as Correct Information Unit or speech rate were not employed in this report.

Finally, it is disappointing that melodic intoning did not yield better MLU than rhythmic tapping. Although from the literature it is not clear which component is more effective (see Schlaug et al., 2010), we would have expected melodic intoning to outperform rhythmic tapping for the former method is more inclusive than the latter. We do not know how to explain the lack of difference between the two methods. Can it also be attributable to the way fluency was measure, or the low intensity of the program? These should be put under close scrutiny in future investigations.

Acknowledgment

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References

Albert, M., Sparks, R., & Helm, N. (1973). Melodic intonation therapy for aphasia. *Archives in Neurolgy,* 29, 130-131.

Belin, P., Van Eeckhout, P., Zilbovicius, M., Remy, P., Francois, C., Guillaume, S., et al. (1996). Recovery from nonfluent aphasia after melodic intonation therapy: A PET study. *Neurology, 47,* 1504–1511.

Bonakdarpour, B., Eftekharzadeh, A. & Ashayeri, H. (2003). Melodic intonation therapy in Persian aphasic patients. *Aphasiology, 17(1),* 75-95.

Chung, Y.M., Lee, S.E., & Chang, M.H. (2001). The concise Chinese aphasia test. Taipei: Psychological Corporation.

Goldfarb, R., & Bader, E. (1979). Espousing melodic intonation therapy in aphasia rehabilitation: A case study. *International Journal of Rehabilitation Research, 2(3),* 333-342.

Helm-Estabrooks, N., Nicholas, M., & Morgan, A. **(**1989). *Melodic intonation therapy program*. San Antonio, TX: Special Press.

Laughlin, S. A., Naeser, M. A., & Gordon, W. P. (1979). Effects of three syllable durations using the melodic intonation therapy technique. *Journal of Speech and Hearing Research, 22*, 311–20.

Norton, A., Zipse, L., Marchina, S., & Schlaug, G. (2009). Melodic intonation therapy: How it is done and why it might work. *Annals of New York Academy of Sciences, 1169,* 431-436.

Popovici, M. (1995). Melodic intonation therapy in the verbal decoding of aphasics. *Romanian Journal of Neurology and Psychiatry, 33*, 57–97.

Porch, B.E. (1981). Porch index of communicative ability. Alberquerque: PICA Programs.

Schlaug, G., Marchina, S., & Norton, A. (2008). From singing to speaking:Why patients with Broca's aphasia can sing & how that may lead to recovery of expressive language functions. *Music Perception, 25*, 315-323.

Schlaug, G., Marchina, S., & Norton, A. (2009). Evidence for plasticity in white-matter tracts of patients with chronic Broca's aphasia undergoing intense intonation-based speech therapy. *Annals of New York Academy of Sciences, 1169,* 385-394.

Sparks, R.W. (2008). Melodic intonation therapy. In R. Chapey (Ed.), *Language intervention strategies in aphasia & related neurogenic communication disorders, 5th edition*. Baltimore, USA: Lippincott Williams & Wilkins.

Sparks, R., Helm, N., & Albert, M. (1974). Aphasia rehabilitation resulting from melodic intonation therapy. *Cortex, 10,* 303–316.

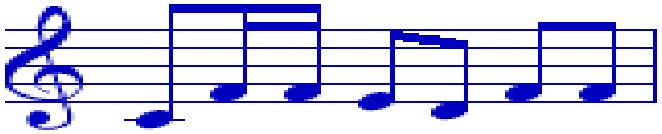
Sparks, R., & Holland, A. **(**1976). Method: Melodic intonation therapy for aphasia. *Journal of Speech & Hearing Disorders, 41*, 287–297.

Vines, B.W., Norton, A.C. & Schlaug, G. (2009). Stimulating music: Combining melodic intonation therapy with transcranial DC stimulation to facilitate speech recovery after stroke. *Transmitters and Modulators in Health and Disease,* Part 3, 103-114.

Wilson, S. J., Parsons, K., & Reutens, D. C. (2006). Preserved singing in aphasia: A case study of the efficacy of the melodic intonation therapy. *Music Perception, 24*, 23-36.

A.

B.



Ni (jin tian) qu (na li) ya?
You today to go where PARTICLE
Where did you go today?

Figure 1. Musical notations for a sentence with an exaggerated rhythm (A) and an intoned pattern (B). The first line under the musical notations is the sentence in Chinese Pinyin; the second line is its literary translation; the third line its semantic translation.

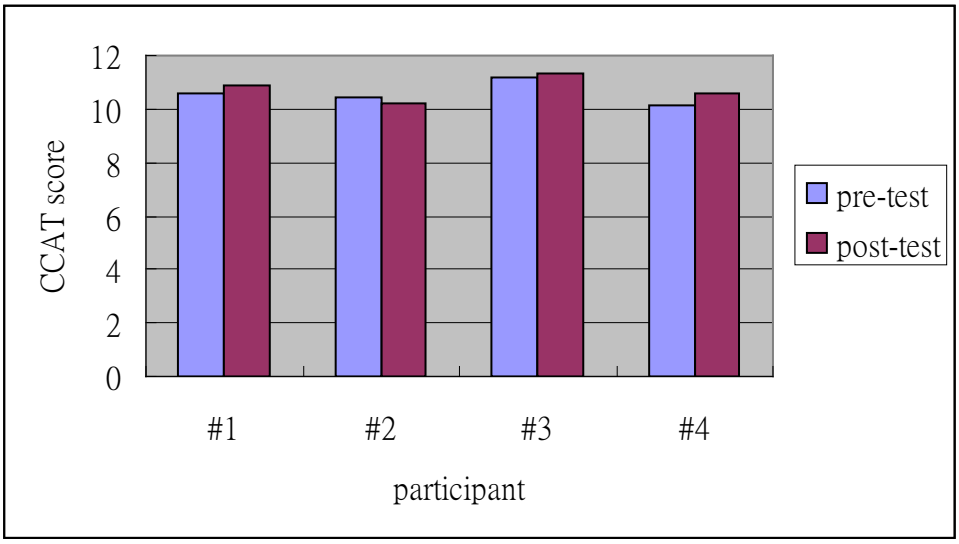


Figure 2. The pre-test and post-test CCAT scores for the four participants.

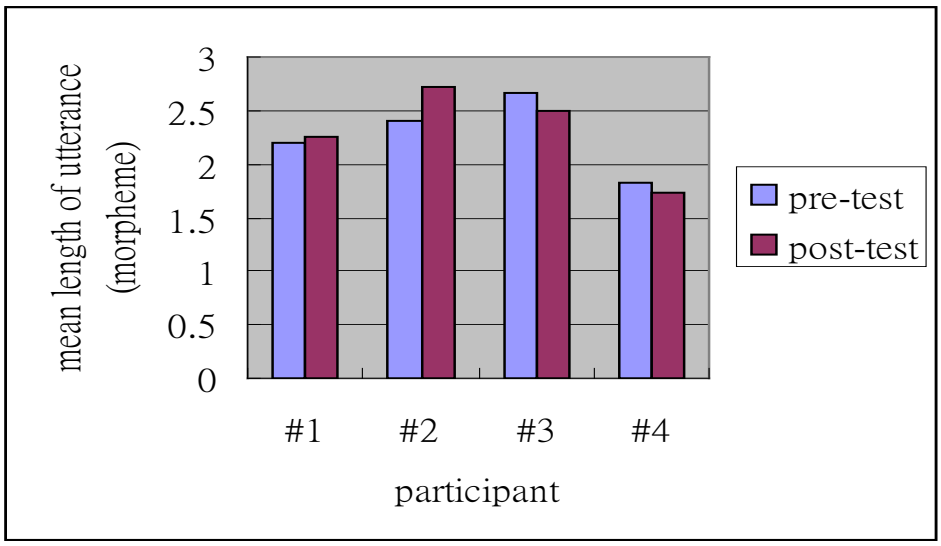


Figure 3. The mean length of utterance on the Picture Description subtest of CCAT in the pre-test and post-test for the four participants.

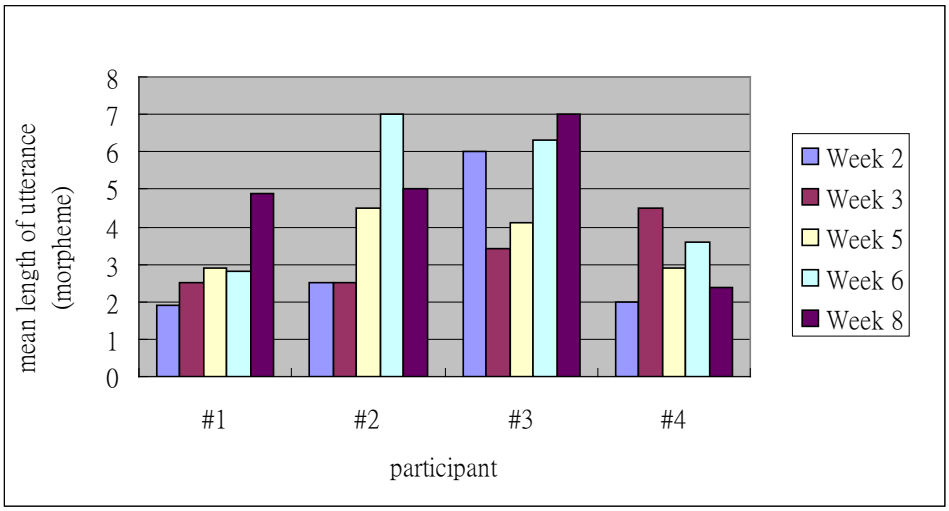


Figure 4. The mean length of utterance of the reviewed items from Week 2 through Week 8 for the four participants.

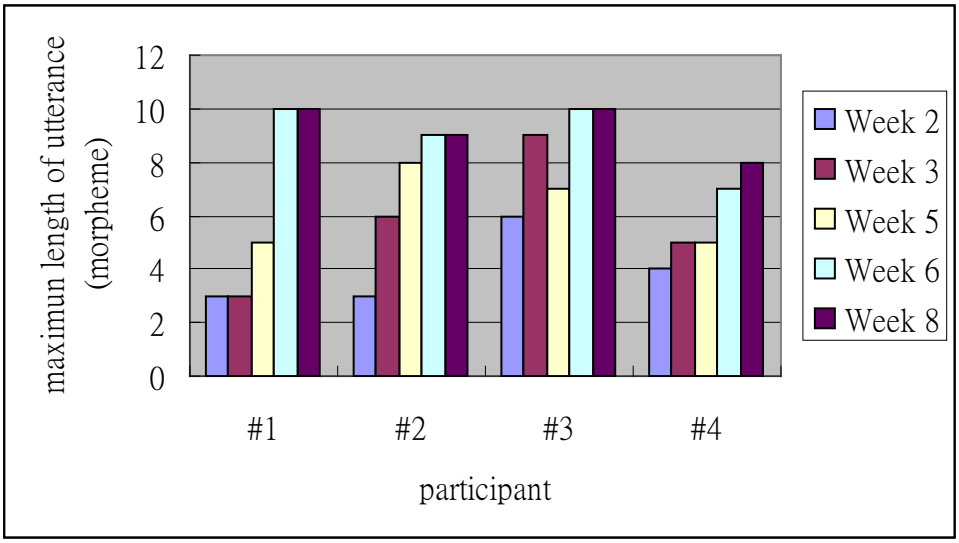


Figure 5. The maximum length of utterance of the reviewed items from Week 2 through Week 8 for the four participants.

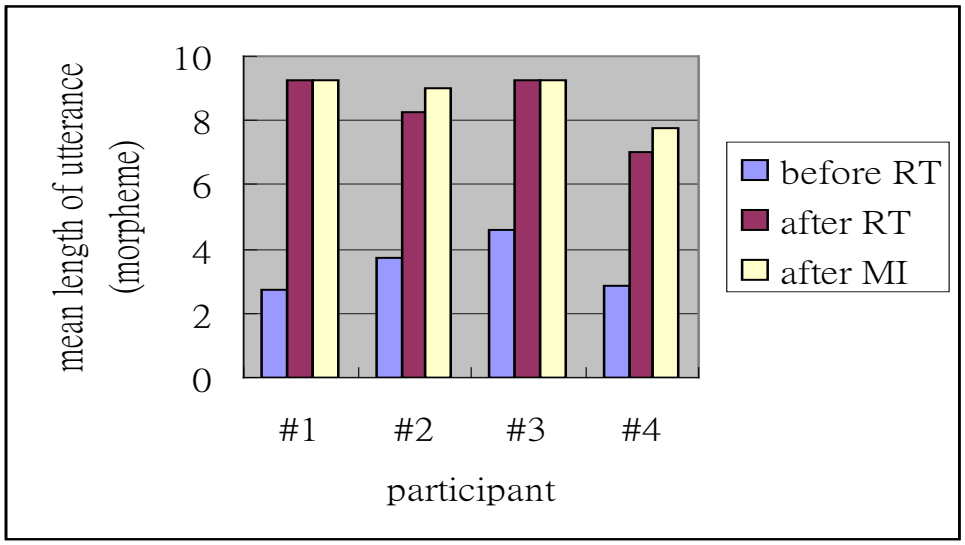


Figure 6. The mean length of utterance of the weekly target item before rhythmic tapping (RT), after rhythmic tapping, and after melodic intoning (MI), over the last four weeks for the four participants.